STANDARD TIME.

The Editor has previously had occasion to explain how the study of the reports of auroras and earthquakes collected by the Signal Service led him, in 1874, to see that accurate results could never be deduced from the numerous reports and conflicting statements unless some simple standard of time could be adopted by the whole community. In those days every railroad and city had its own standard and sometimes half a dozen different clocks could be found in the same central or union depot. In May, 1879, he presented a report to the American Metrological Society of New York, recommending the system of hourly meridians counted from Greenwich, as a first step toward the universal use of Greenwich time itself. When this recommendation had been adopted by the railroad and transportation companies, through the active advocacy of W. F. Allen, as general superintendent of railroad time tables, and when it had been recommended by the International Time and Meridian Conference there was no longer any doubt that it would eventually, but perhaps slowly, be adopted throughout the world.

These expectations have already been most fully realized. In a few cases smaller subdivisions, such as a half or quarter of an hour, have been preferred. We believe that France still holds out against the Greenwich meridian and prefers that of the Paris Observatory. The last important government to agitate the subject is that of the Empire of India. According to Science and the London Times the last issue of the Proceedings of the Asiatic Society of Bengal contains a paper on this subject by the Superintendent of the Geological Survey of India, Mr. Oldham, who describes the present system of that country as simply "barbarous." The railways and the telegraph department adopt Madras mean time, but each town and city has its own time, which is neither local mean time nor any other time. It requires forty-four pages of the official telegraph guide book to enumerate the local variations from the standard time. Mr. Oldham states that inextricable confusion has been introduced into a large number of records of the great earthquake of 1897, and urges that the hour zone system be adopted to the exclusion of all others.

In this connection, the Editor would repeat what he has had occasion to say before, namely, that telegraphs, telephones, and first-class clocks and watches are now so universal that it is easy to get standard Greenwich time at any locality and to any degree of accuracy, but not so easy to get local astronomical mean time. The irregularities in the records due to errors in defining what time is actually used by any observer are now much more important to students of meteorology, seismology, terrestrial magnetism, and auroras than in former times, since we now have so many more observers and strive after greater accuracy in the results. There are a few problems in which the consideration of local mean time is important; for such study the records kept on the Greenwich hour standards can easily be converted into mean time records by the student himself. But in many other most important respects, standard Greenwich time itself is both convenient to the observer and essential to the investigator. The advantages of adopting the local Greenwich time and day for ll studies of atmospheric storms and changes outweigh the disadvantages.

The change to one standard from a hundred different local or quasi-local times which began in October, 1884, was resisted by many for fear it would make the sun set a little too early or change the hours of work and meals. Similar objections were made two hundred years ago, when mean time clocks began to supersede the sun dial and the gnomon. In fact, the English common law still requires that noon shall be noon by the sun, which may be fourteen minutes later than mean noon in February, or four minutes earlier in May, or six minutes later in July, or sixteen minutes earlier in November. Now, however, these unnecessarily conservative and antiquated objections are replaced by the conviction that so long as their watches all agree the people of a given region will know exactly what is meant when a given hour is mentioned, and this precision and uniformity is worth everything to a civilized community.

With the spread of ocean cables and the daily presentation of news from a hundred places scattered over the whole globe, it is now necessary for us to contemplate the next step in the use of standard time by the civilized world. Every one daily finds himself figuring out whether a certain event occurring in the Philippines at 10 a. m. happened this morning or yesterday morning. Our international commercial intercourse will become precise only when we adopt Greenwich dates and Greenwich time throughout the world. This improvement, conducing as it does to the transaction of daily business, will not injure but rather be helpful to meteorology. No one has ever attempted to plot upon an ocean chart the observations of a storm by a hundred vessels at sea, but has found inextricable difficulty with records that are kept by the rules of the ancient navigators; the trouble is with the date of the month and day of the week. The modern navigator and the modern business man will do well to think, speak, and write of Greenwich days and dates only, if he would attain precision in current history.

THE ETHER AND THE ATMOSPHERE.

A correspondent proposes the following theory as to the cause of atmospheric changes:

I have a camphor barometer hermetically sealed so that the air can not directly produce any changes within the liquid. It frequently indicates weather changes thirty-six hours in advance. This has led me to suppose that atmospheric changes are due, primarily, to the action of the ether, as ether waves alone could penetrate the glass to the liquid within the sealed up tube. Kindly state whether our knowledge of the relations that ether waves bear to our atmosphere render such an hypothesis tenable?

The following is quoted from the Editor's reply:

The Weather Bureau does not generally commit itself to any theory as to the ultimate causes of meteorological phenomena. We speak of the heat received from the sun as the cause of the warmth of the ground and air and of evaporation and all resulting atmospheric disturbances. We recognize the fact that the light and heat can not come from the sun to the earth without the intervention of the ether of space, which is merely the carrier, and would have no appreciable influence if the sun did not set it in motion. Physicists tell us that everything done by ponderable atoms and molecules is due to the action of the ether forcing them hither and thither. But these questions belong to the study of molecules and not to the study of meteorology as such.

It is evident that in the present state of meteorology the action of solar radiation on the atmosphere is so complex that for aught we know all observed meteorological phenomena result from this one source of disturbance, and until we have completely explored this main subject, we have no reason to abandon this study and call upon new hypotheses to help us.

FROM HONOLULU TO IOWA.

Under date of June 7, Mr. Curtis J. Lyons writes to the Editor, from Honolulu:

I am of the opinion that the electric storm and tornado area which prevailed with you on May 28, passed here on the 18th.

Probably many outside of America have an exaggerated idea of the extent and meteorological importance of the tornadoes to which Mr. Lyons refers. On the 28th and 29th thunderstorms were certainly more numerous over the United States, as a whole, than on the other dates of the month, and yet, both the 2d and the 31st were nearly as conspicuous. Three groups of tornadoes formed along the ninety-ninth meridian on the 27th, about 6 o'clock p. m., central time, and moved eastward. Similarly, on the 28th, small tornadoes occurred in Iowa. On the 29th a squall in Buffalo; on the 30th, tornadoes in South Dakota, Nebraska, Missouri, and Iowa, the latter passing eastward into Illinois.

If we think of the 27th–31st as a period during which there prevailed in the United States an area of thunderstorms and tornadoes that had occupied ten days in moving eastward from the Sandwich Islands, then we must, of course, expect these disturbances to have been observed, or at least felt, at some intermediate point, otherwise we should have no reason whatever to connect these two distant localities together. Now, the fact is that the daily weather maps, the reports of the various State sections for the month of May, the reports of vessels from the ocean, and the daily newspapers agree in showing no special frequency of thunderstorms, tornadoes, waterspouts, auroras, or any other atmospheric disturbances over the whole tract of 70° in longitude, or 4,000 miles, between the Sandwich Islands and the Mississippi Valley. We must, therefore, for the present, withhold acquiescence in the conclusion expressed by our distinguished correspondent. An examination of the Honolulu record for May shows that an area of low pressure existed near that region on the 18th. It probably passed westward, in accordance with the usual movements in this part of the Pacific, and could, therefore, hardly be expected to reach the Mississippi Valley in ten days. If, however, it was not a well-defined cyclonic system, but simply the western end of a long trough of low pressure, then, indeed, the disturbances at Honolulu and in the Mississippi Valley might be due to the same ultimate cause, although neither one produced the other.

We believe most firmly that the weather in any one part of the world depends in part upon what is transpiring in distant regions. A hurricane in the West Indies and cool northerly winds over the Atlantic States; a cold wave in Florida preceded by a blizzard in Montana; drought in Great Britain, preceded by droughts in the United States, and these preceded by droughts in India, are cases in point. The precise nature or mechanics of these connections will be unravelled as meteorology advances. We hope that Mr. Lyons will communicate to the MONTHLY WEATHER REVIEW some account of his studies on this subject.

DO LOCAL STORMS FOLLOW RIVER VALLEYS?

Dr. Samuel D. Irwin, of Tionesta, Forest County, Pennsylvania, under date of July 27, communicates the following case:

One of the heaviest rainfalls for many years occurred here on Tuesday night, 25th inst., between 7 p. m. and 12 o'clock, there being a fall in five hours of 8 inches, according to others of 7.50 inches, but most who observed put it at 8 inches. This rain was local in its character. It washed out streets and alleys on the side hill and caused much damage.

There was but little thunder and lightning. The next day, Wednesday, was "as clear as a bell," as well as to-day, with the exception of a few floating clouds early in the morning. On the 26th of June there was also a very heavy dash of rain in the forenoon about 10 o'clock which lasted nearly an hour and a half, it seemed to pour down, many thought it was a cloudburst, which is an indefinite term; the oldest inhabitant never knew it to rain so hard for so short a time in this section, the rainfall on that day was 5 inches, much like this last rain in character, accompanied by but little thunder and lightning. One remarkable feature of this June rain was that it did not cover a belt of over 6 miles north and south of Tionesta Borough, as was ascertained, it did much damage to roads and bridges, causing washouts of three small bridges on one road alone.

At this place, Tionesta Creek, a considerable stream joins the Allegheny River, coming in directly east, while the general course of the river is from north to south, which in the opinion of some seems to verify the theory that the rain clouds follow the streams to a considerable extent, at least this seems to be the case in the whole extent of the upper Mississippi valley.

Can the further progress of this storm be traced so as to show whether the part here described was but a fragment of its whole history? Can other localities of frequent local rains be found in Pennsylvania? Do not the local rains form rivers and valleys rather than the valleys attract the rains?—ED.

WEATHER BUREAU MEN AS UNIVERSITY LECTURERS.

In continuation of our remarks in the MONTHLY WEATHER REVIEW for June, (page 256), the Editor desires to put on record all that is being done by Weather Bureau officials in the way of lectures and instruction in colleges and universities in the departments of climatology and dynamic meteorology. The following items will show the thoroughness with which some of our co-laborers present these subjects to their students.

Mr. J. Warren Smith, B. S. (Dartmouth, 1888), Section Director, United States Weather Bureau, Columbus, Ohio, delivered a short course in meteorology at the State University, Columbus, Ohio, on Tuesdays and Thursdays during the spring term of ten weeks beginning March 29, 1899. This course was obligatory for the junior class in agriculture and horticulture, but was elective for the students in the college of arts, philosophy, and science. A fee of $5 was paid to the University. The daily weather maps and Davis' Elementary Meteorology were used as text-books. A question box formed an important part of the laboratory equipment. The same course will be given during the winter of 1899–1900 at the request of the trustees of the university.

The object of this course is to open and outline a rational and systematic line of study of the leading facts concerning our atmosphere, of the methods of observing and investigating the daily weather changes, and of the physical laws underlying these changes; thus training the student in scientific methods of investigation, and furnishing the foundation for later studies in advanced meteorology. To encourage the study of the daily weather maps, and to familiarize the student with the work and the reports of the United States Weather Bureau; that he may become more fitted for appointment in the Weather Bureau, or, in private life, may reap more practical benefits from this important branch of the Government service.

Outline of the course.—The actual weather conditions, as found on the weather maps, will be studied from day to day with the theories for these occurrences, the problems found there, and the correlation of the different weather elements as presented in the different parts of our country. An intelligent use of the weather maps for personal weather prediction, with some of the problems presented to the forecaster, will be shown. Weather Bureau instruments will be put in use; and actual and accurate observing, reducing and recording of the different weather elements will be a part of the regular work. Practical work in map and chart making will be carried on.

In the text-book the general relations of the atmosphere and its extent and arrangement about the earth will be first taken up. Then the effect of solar radiation upon atmospheric temperatures, with the distribution of insolation over the earth, conduction and convection in the atmosphere, reflection, absorption, radiation, inversions of temperature, etc., will be considered; to be closely followed by a discussion of the measurement and distribution of atmospheric temperatures over the earth, with the description of the instrument used, and isothermal charts of the earth and of the different countries. One lesson will be given upon the colors of the sky, with the problems of such colors, and upon the atmospheric phenomena of halos, parhelia, etc., in their relation to the probable weather changes, before entering upon the much more complicated discussion of the pressure and circulation of the atmosphere, the general classification of the wind, etc. Under the head of The Moisture of the Atmosphere will be considered evaporation, latent heat, absolute and relative humidity, the formation of